

Measuring the Rhythmic Properties of Eye Movements

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Method

Subjects (n=18) were given the task of shifting their gaze between two horizontally aligned fixation points in the tempo of an isochronous beat. The beat was given by 50 msec square wave beeps of 440 Hz with inter onset intervals of either 0.5 or 1.0 sec. Each subject was recorded during 16 session of 30 s. each. Gaze position was recorded using a high-speed eye tracker.

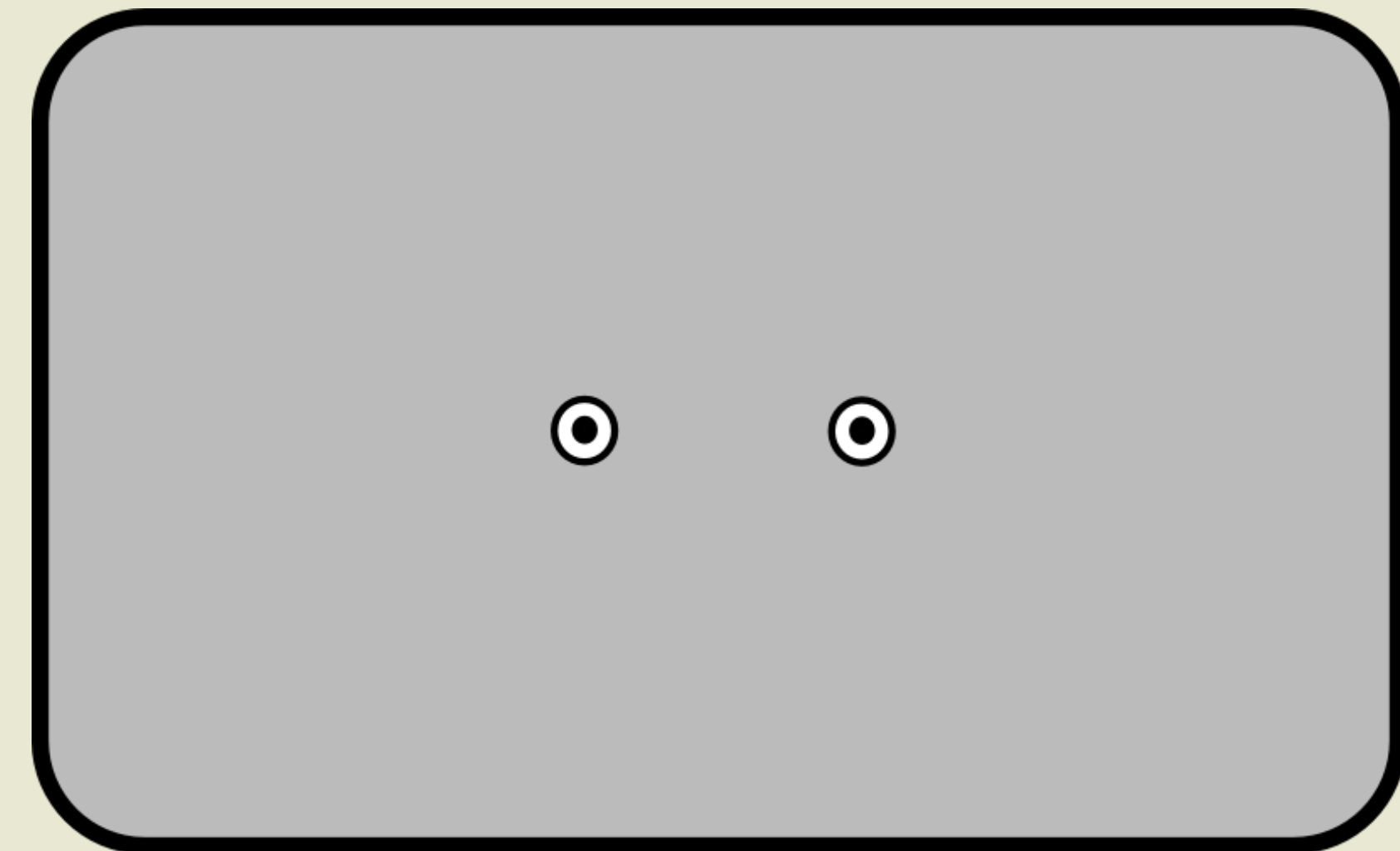


Figure 1: The display shown to the subjects in the experiment.

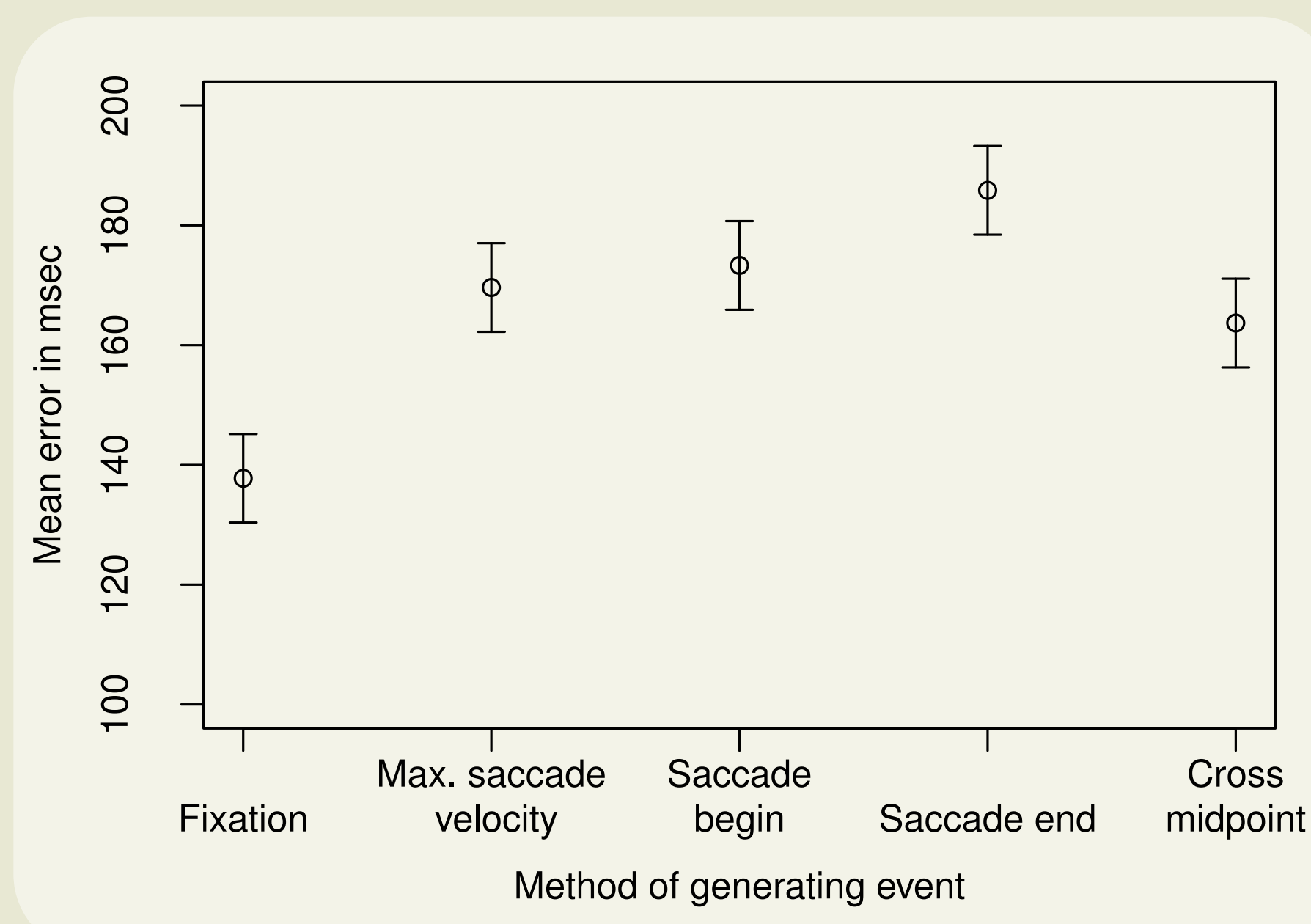


Figure 2: Mean error in msec. of the 18 subjects by tapping method. The error bars show the standard error given by the ANOVA.

The Event of Synchronisation

When finger tapping striking a surface with the finger is synchronised with a beat. When using the eyes the event of synchronisation is not obvious. Five different ways of generating events were implemented and a fixation based method resulted in significantly lower mean error (repeated measures ANOVA) and was used in the subsequent analysis.

Result

The mean error, as measured by taking the absolute value of the asynchronies, was 137 msec and the mean of the SDs of subjects' asynchronies was 157 msec. Even though this is a large error subjects reported that the task was manageable but straining for the eyes. Similar to finger tapping, subjects anticipated the sound and all subjects, except one, had a negative mean asynchrony.

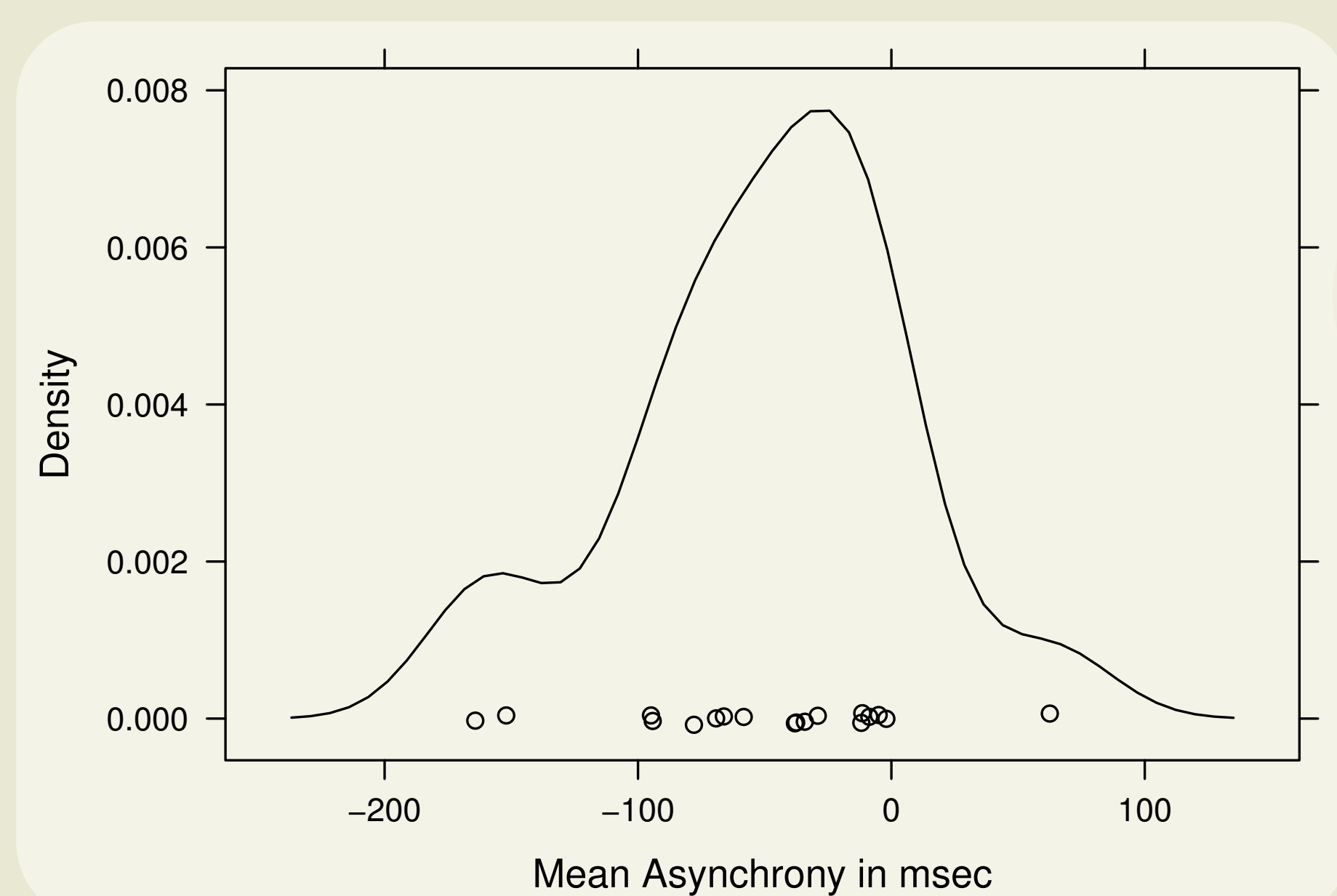


Figure 3: Mean asynchrony in msec between the fixation-events and the sound onsets for each subject. The mean of all subjects was significantly different from zero (t-test, $M = -50$ msec, $p < 0.01$)

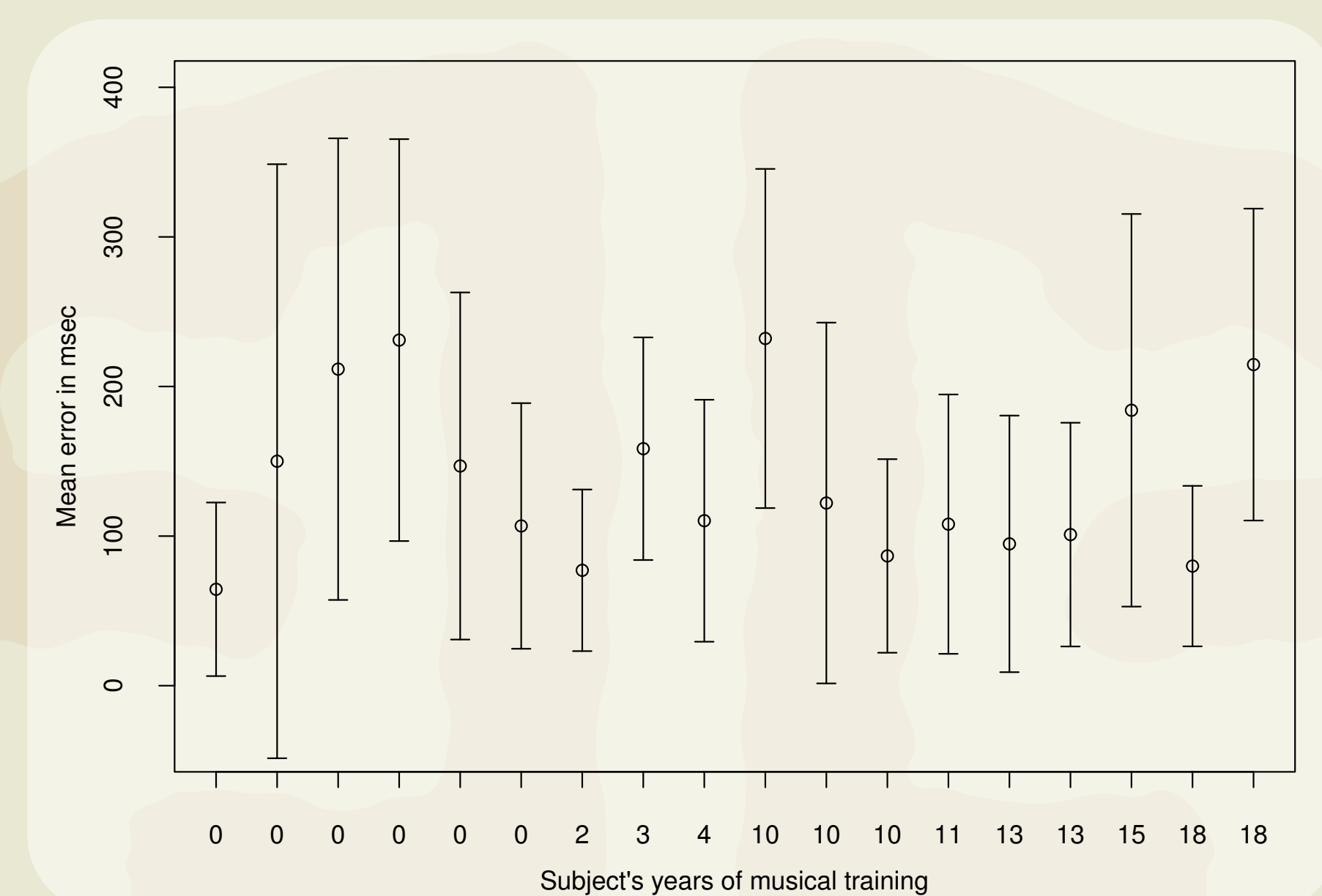


Figure 4: Mean error for all subjects sorted by years of musical training. There was no significant correlation between musical training and subjects' performance. The error bars show the SD.

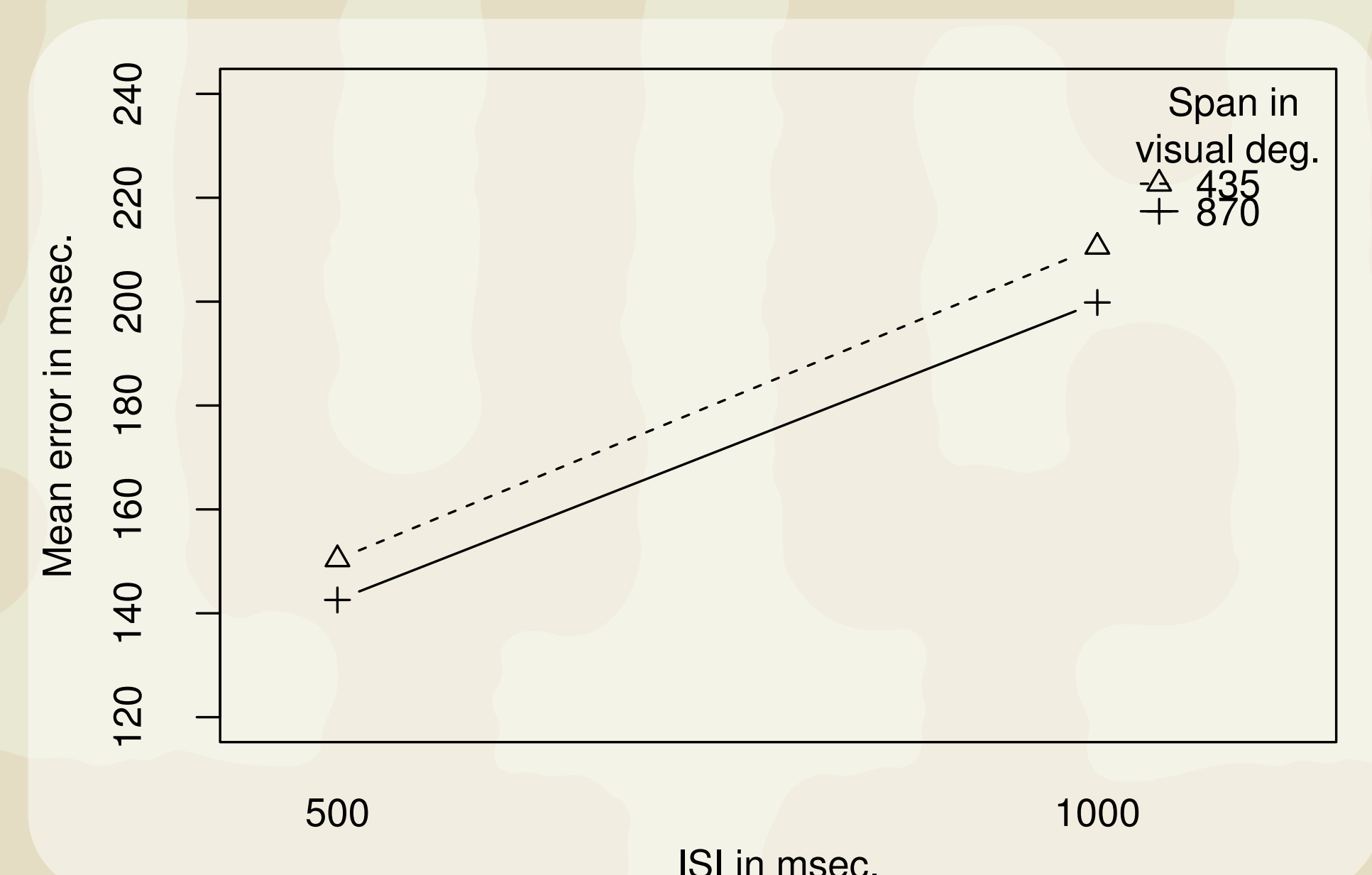


Figure 5: Mean error divided by ISI and span between the two fixation points. There was a significant difference within these factors but no significant interaction (repeated measures ANOVA).

Acknowledgements

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References

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